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Survival of Yellow Birch Reproduction on the Dunbar Stream Clearcut Seventeen Years After Harvest

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Department of Forests, Mines & Energy
Timber Management Branch

INTRODUCTION

The construction in the 1960's of the hardwood using pulpmill at Nackawic, New Brunswick gave rise to the first large scale clearcutting in the New Brunswick hardwood forest.

One of these clearcuts[1] was investigated by the New Brunswick Department of Natural Resources Forests Branch in 1971, three years following clearcutting. The following is a report of changes in the main stand components seventeen years following harvest of the original stand.

THE STUDY AREA

The Dunbar clearcut is located in the Nashwaak-Miramich site district of the Maritime Lowlands Ecoregion. The topography is slightly undulating with good drainage (see location map. Figure 1).

The original stand is typical of hardwood ridges in New Brunswick consisting of mainly maple, beech, yellow birch and a few scattered spruce and balsam fir and other hardwood

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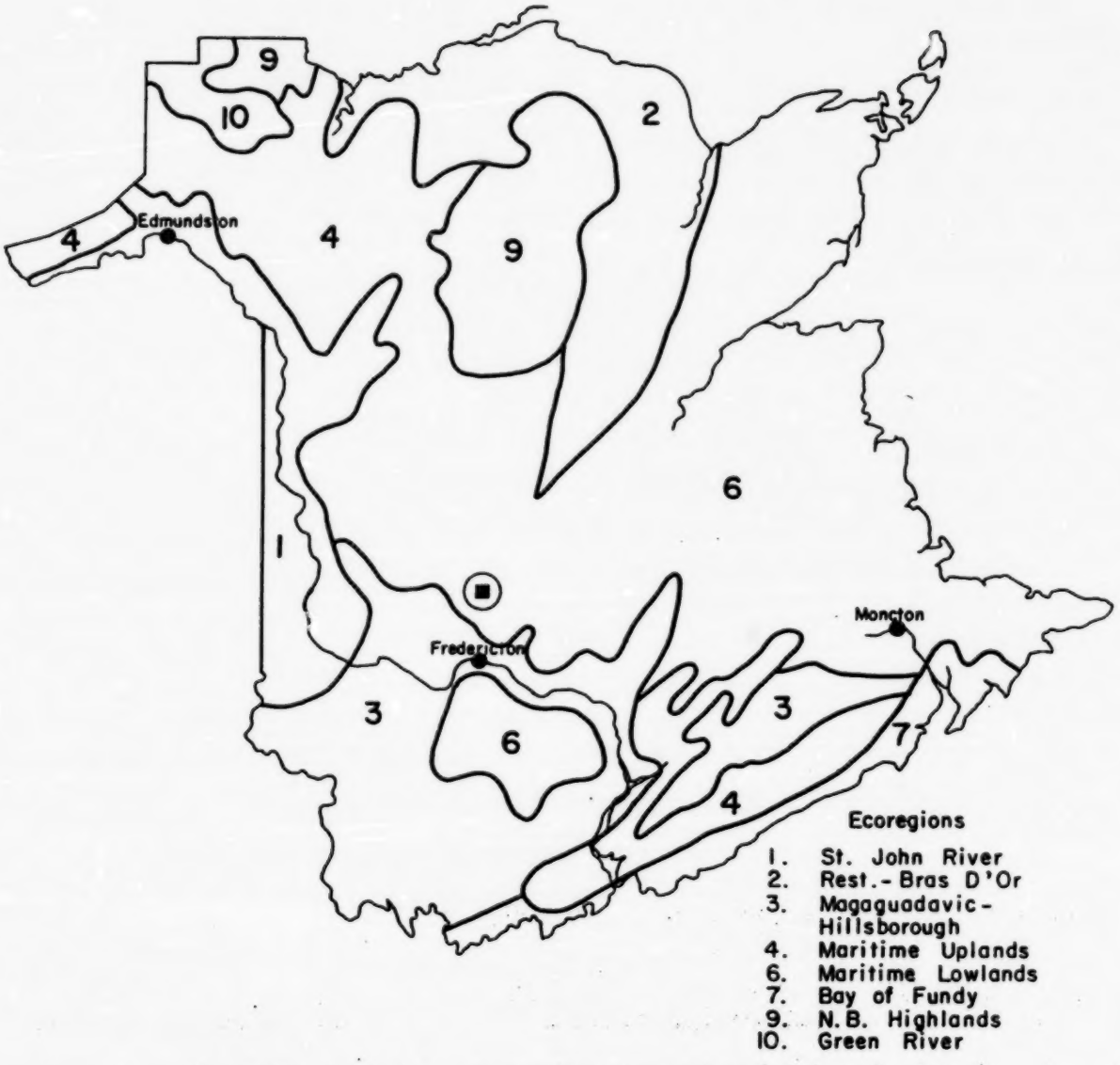
1. Carlin, D. A. 1971. An Investigation of Natural Regeneration of Clearcut Hardwood Stands in the Shogomoc and Dunbar River Watersheds. Forests Branch, Department of Natural Resources, Province of New Brunswick.



Simplified from O.L. Loucks, "A Forest Classification For The Maritime Provinces".

Figure 1. Location of Dunbar Clearcuts ◉

species. There is usually a wide range of tree sizes and ages in such stands due to past disturbances such as logging. Most of the advance reproduction is hardwood with maple and beech the most commonly occurring species. Yellow birch becomes established by seeding in after logging. The new forest is also composed of many stems of vegetative origin, mainly the maple and beech.

METHODS

Circular sample plots of 4 square meter area were located along parallel compass lines at intervals of 50 metres. This plot size is consistent with the 1971 survey. An attempt was made to locate the sample lines close to the original 1971 locations. However, because of disturbance (spacing) in some areas a few sample lines had to be located in nearby undisturbed areas. All sample plots were, however, within the original stand boundaries. A total of 114 sample plots were measured.

All tree species occurring on the sample plots were measured at DBH and individual heights recorded. The origin of each tree was recorded as in the 1971 survey. Tree origin could be (1) seedling, (2) seedling sprout, (3) root sprout, (4) stump sprout or (5) residual. Because of the passage of time and the subsequent decay of stumps, many of the observations in regards to origin could be subject to mis-classification.

RESULTS

In 1971[1], it was predicted that red maple abundance and importance in the new stand would decline over time. This observation is supported by the results of the 1985 survey.

Table 1. Relative density, stocking and dominance by species for 1971 and 1985.

Species	Density 71	Density 85	Stocking 71	Stocking 85	Dominance 71	Dominance 85	RI* 71	RI* 85
Yellow Birch	20	27	79	41	12	32	111	100
Red Maple	20	6	68	9	15	6	103	21
Beech	15	20	66	35	18	12	99	67
Sugar Maple	20	22	64	33	9	15	93	70
Pin Cherry	13	8	53	17	26	11	92	36
White Birch	4	6	26	14	4	11	34	31
Balsam Fir	3	8	29	14	1	4	33	26
Poplar	2	1	18	3	12	2	32	6
Spruce	2	1	12	6	3	5	17	12
Ironwood	*	-	3	-	0	-	3	-
Hemlock	*	-	1	-	0	-	1	-
Striped Maple	-	1	-	4	-	2	-	7

* Relative importance - sum of density, stocking and dominance

1. See Footnote Page 1

Table 1 shows that red maple was second in its contribution to stand structure in 1971 but by 1985 its relative importance had decreased to 7th place.

The reason for this decrease is the relative intolerance of red maple seedlings which were very abundant in 1971. Red maple represented 20 percent of reproduction in 1971 but by 1985 it was only 6 percent of total stand density. A decline of 70 percent.

Of concern in 1971 was the fate of yellow birch, a species of moderate shade tolerance. Yellow birch is a very desireable species for veneer logs as well as pulpwood. Would the yellow birch show a decline similar to red maple was the question posed in 1971? It was suggested that because yellow birch was not in a dominant height position in 1971 (Figure 2) compared to other species that early spacing should be considered to release yellow birch to improve its competitive position.

The 1985 survey shows encouraging results as to the natural competitiveness of yellow birch. It has not only maintained itself without release, but has increased in dominance over the period to a first place position in overall stand structure (Table 1). This is important to stand managers since leaving the stand to thin itself naturally is an alternative to early and expensive spacing. This gives the stand a chance to develop a longer clear bole before thinning to good quality trees.

Another major component of the stand in 1971 was beech. In second place in 1971, beech has declined in relative importance

to third place behind yellow birch and sugar maple. Sugar maple, the second most important species in the present stand has improved its position from fourth place in 1971 (Table 1). Sugar maple and yellow birch, the most desireable of the hardwood species have survived very well since the 1971 survey.

Pin cherry, an undesireable species, has as expected declined greatly over the period. Pin cherry can easily dominate a site after clearcutting because of rapid initial height growth. In 1971 the average dominant height of pin cherry was greater than all other species (Figure 2) except red maple sprouts, but by 1985 it had fallen behind maple and yellow birch.

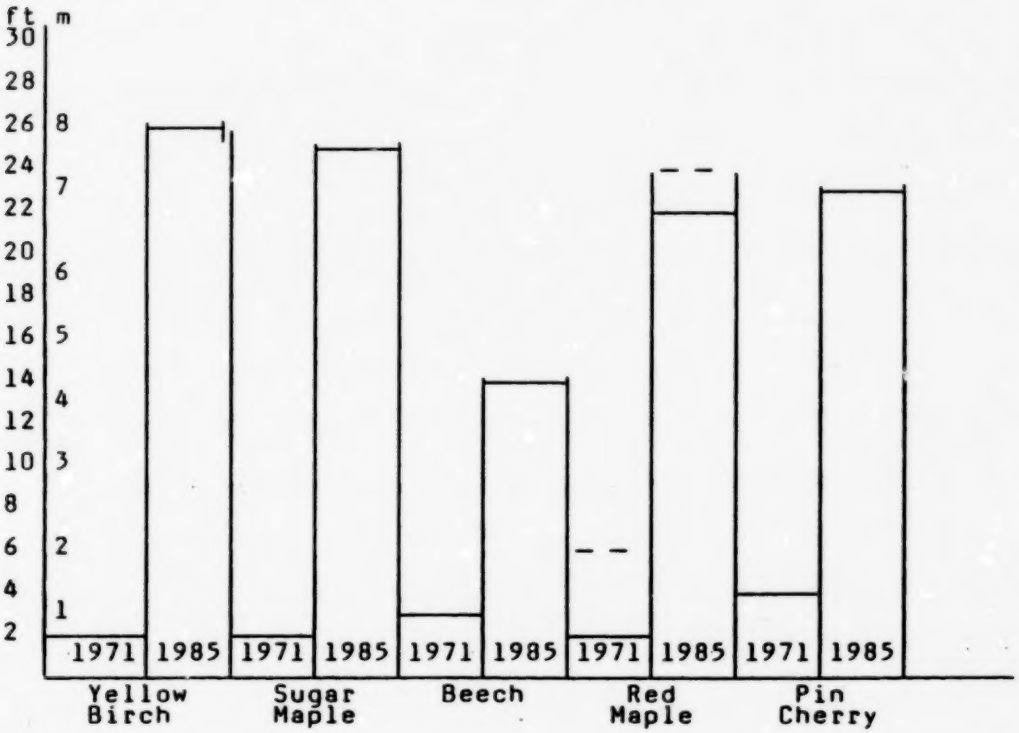


Figure 2. Average dominant height of the major species in 1971 and 1985. Red maple Sprouts (--).

Although in fourth place, pin cherry is predicted to decline over time because of a fungus disease which effectively controls this species on most sites.

With the exception of poplar, the proportions of other species has changed very little over the period. Of interesting note, Figure 1 confirms the belief that red maple sprouts which were the tallest species in 1971 soon lose their initial vigor. In 1985 both yellow birch and sugar maple had a dominant height greater than red maple of stump sprout origin.

Very little differentiation in diameter growth is evident seventeen years after harvest (Figure 3).

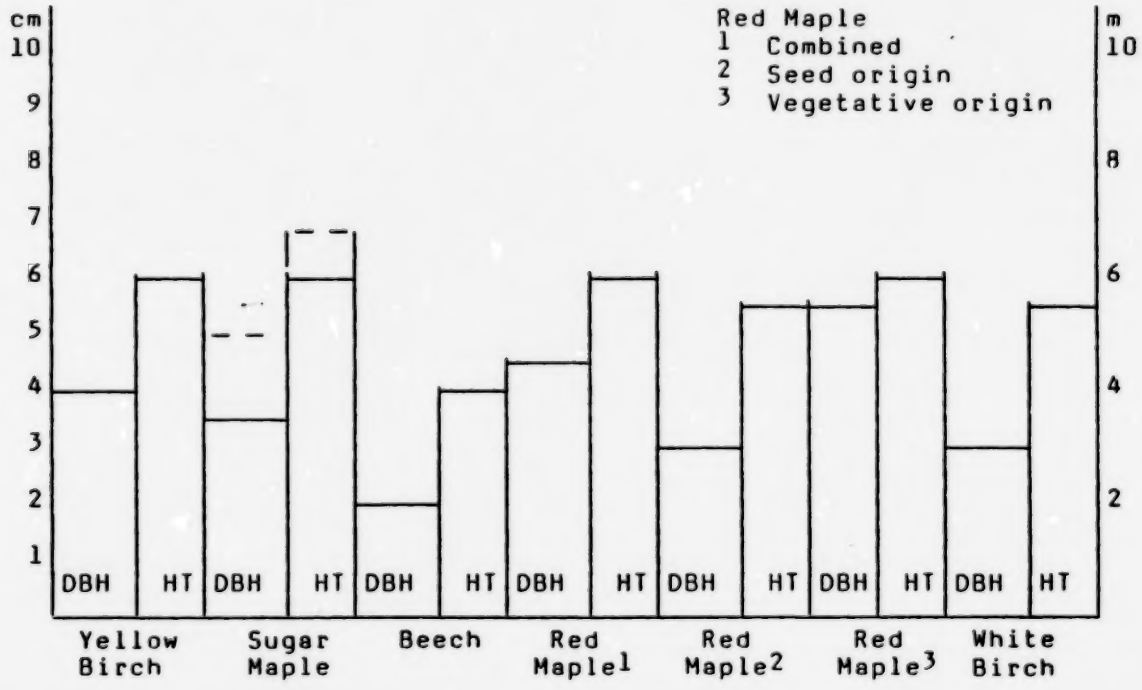


Figure 3. Average diameter (breast height) and height of selected hardwoods (--- sugar maple stump sprouts).

Figure 3 shows that the major species yellow birch and maple are approximately 4 cm at breast height. Beech shows the slowest growth rate and red maple of sprout origin the largest. Red maple sprouts are considerably larger in diameter than red maple of seed origin. This may be an important point to consider in spacing of this species. Sugar maple data showed similar results (Figure 3).

CONCLUSIONS

Although the present study covers a relatively small part of the hardwood areas which have been clearcut since the late 1960's, it is safe to conclude that large mechanical hardwood clearcuts are responding adequately. The most important species are maintaining their proportions in the new forest and there appears to be very limited long term competition from undesireable species. Of significant note is the increase in yellow birch which was noted in the 1971 survey, is still maintaining a dominant position in the new forest structure. The relative importance of less desireable species such as red maple and beech are declining over time.